Claims

1. Photoactive component with organic layers, comprising a solar cell having a series of organic thin layers and contact layers with a doped transport layer and a photoactive layer, which are arranged in a first pi, ni or pin diode structure comprising a first p, i or n layer each, wherein the transport layer exhibits a greater optical band gap than the photoactive layer and the structure is partially transparent in at least one part of the solar spectrum from 350 nm to 2000 nm.

2. Photoactive component according to Claim 1, wherein the photoactive layer is separated before, during and after separation of the contact layers through the transport layer.

3. Photoactive component according to Claim 1, wherein an optical path of incident light is extended in the photoactive layer by means of a light trap.

4. Photoactive component according to Claim 3, wherein the light trap is formed in such way that the doped transport layer exhibits a smooth boundary layer to the i-layer and a periodically micro-structured interface to a contact area.

5. Photoactive component according to Claim 3, wherein the component is located on a periodically micro-structured substrate and the doped transport layer is positioned to ensure a homogenous function of the component on the entire area.

6. Photoactive component according to Claim 1, wherein the i-layer comprises several layers with different absorption spectra.

7. Photoactive component according to Claim 1, wherein a second pi, ni or pin diode

structure is provided, wherein a transport layer of the second structure exhibits a greater optical band gap than a photoactive layer of the second structure and the second structure is partially transparent in at least one part of the solar spectrum from 350 nm to 2000 nm.

8. Photoactive component according to Claim 7, wherein the i-layers of the first and second structures exhibit a same optical absorption respectively and are each optically thin, so that they transmit at least 50% of light at an absorption maximum, or the i-layers of the first and second structures exhibit different optical absorption spectra which complement each other.

9. Photoactive component according to Claim 7, wherein at least three structures are present which comprise both several optically thin i-layers with a same absorption spectra as well as i-layers with different, complementary absorption spectra.

10. Photoactive component according to one of Claims 7, wherein the i-layer of at least one of the structures compromises several layers with different absorption spectra.

11. Photoactive component according to Claim 7, wherein the n-layer or p-layer which is near to a transition between two structures exhibits a doping.

12. Photoactive component according to Claims 7, wherein a layer of a metal, a salt or an inorganic material is incorporated between a p-layer of an n-th structure and an n-layer of an n+1-th structure.

13. Photoactive component according to Claim 12, wherein several layers of a metal, a salt or an inorganic material are incorporated between the p-layer of the n-th

structure and the n-layer of the n+1-th structure.

14. Photoactive component according to Claim 12 , wherein one or more doped layers comprising an organic or inorganic semiconductor material are incorporated.

15. Photoactive component according to Claim 12, wherein a transparent or semitransparent layer is added comprising a metal, a salt or another inorganic material, preferably a TCO (transparent conductive oxide), or several of these layers.

16. Photoactive component according to Claim 12, wherein a layer is incorporated comprising nano-clusters of a metal, a salt or another inorganic or organic material or several such layers.

17. Photoactive component according to Claim 7, wherein a transparent or semitransparent contact for individual contacting of the first and second structures is added between a p-layer of an n-th structure and an n-layer of an n+1-th structure.

18. Photoactive component according to Claim 7, wherein one or more light traps are used.

19. Photoactive component according to Claim 7, wherein the contact layers comprise highly transparent ITO (indium tin oxide), other transparent and conductive materials, such as ZnO, conductive polymers or metal as a semitransparent layer.

20. Photoactive component according to Claim 7, wherein a thickness of the i-layers, is selected in such way that all structures provide the same photoelectric current

under consideration of distribution of an optical field in the photoactive component.

21. Photoactive component according to Claim 1, wherein the p-layer comprises a p-doped layer, an i-layer comprises an undoped layer in electrical terms or a layer only slightly doped in comparison to doped layers, of which at least one is formed as a layer absorbing photons and generating current and hence as a photoactive layer, and an n-layer comprising at least one n-doped layer.

22. Photoactive component according to Claim 1, wherein an entire structure of the component is provided with a transparent and a reflecting contact.

23. Photoactive component according to Claim 1, wherein the contact layers comprise metal, a conductive oxide, in particular ITO, ZnO:A1 or other TCOs, or a conductive polymer, in particular PEDOT:PSS.

24. Photoactive component according to Claim 21, wherein a thickness of the n-doped or p-doped layers is selected in such way that a position of the i-layer is optimized in relation to a field strength distribution of an optical field.

25. Photoactive component according to Claim 1, wherein a doping thickness in one or more of the photoactive or transport layers exhibits a gradient, whereby the doping thickness in the transport layer decreases in the direction of the photoactive layer.

26. Photoactive component according to Claim 1, wherein components in the photoactive or mixed layers, comprise organic materials.

27. Photoactive component according to Claim 1, wherein at least one dopant comprises an alkali metal.

28. Photoactive component according to Claim 1, wherein at least one part of the photoactive layers is comprised wholly or partially of inorganic materials.

29. Photoactive component according to Claim 1, wherein at least one part of the transport layer is comprised wholly or partially of inorganic materials.

30. Photoactive component according to Claim 1, wherein organic acceptor molecules from the class of quinones, tetracyanoquinodimethane, (TCNQ derivatives such as F4-TCNQ), dicyanoquinodiimine (DCNQI derivatives) and corresponding derivatives of higher quinones (naphthoquinone and anthraquinone derivatives) are used for p-doping of the transport layers.

31. Photoactive component according to Claim 1, wherein a material from one of the following material classes is used as a host material for a p transport layer:

a) Derivatives of tetraphenyldiamine (TPD), whose ionization energy is lowered through electron-separating substituents such as methoxy or methyl groups, as well as spiro derivatives thereof,

b) Trimethylamine derivatives, in particular derivatives of tris(diphenylamino)-triphenylamine (TDATA), triaminophenly derivatives, triphenlybenzene derivatives,

c) Oligomers which receive a donor character through the use of thiophene rings, in particular oligothiophenes,

d) Derivatives of oligo-para-phenylene vinylenes (OPPV),

e) Porphyrines or phthalocyanines,

f) Perylene or terrylene derivatives.

32. Photoactive component according to Claim 1, wherein a material from one of the following material classes is used as a host material for an n transport layer:

a) Derivatives of perylene or naphthalene tetracarboxylic acid diimide (PTCDI, NTCDI), perylene or naphthalene tetracarboxylic acid dianhydride (PTCDI, NTCDA) perylene or naphthalene tetracarboxylic bisimidazole (PTCDI, NTCBI),

b) Fullerenes such as C60 or C70 and derivatives thereof,

c) Phthalocyanines or porphyrines, whose electron affinity has been increased through electron-attracting substituents such as fluorine or chlorine,

d) Quinones,

e) Oligomers with increased electron affinity through substituents such as fluorine, chlorine, CF3, CN etc., e.g. fluorinated oligophenyls,

f) Oxadiazol derivatives.

33. Photoactive component according to Claim 1, wherein the photoactive layer contains primarily donor-like substances from the material classes cited in Claim 31 and primarily acceptor-like substances from the material classes cited in Claim 32.